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NEW HAMPSHIRE COLLEGE

AGRICULTURAL EXPERIMENT STATION

STRAWBERRIES IN NEW HAMPSHIRE

Test of Varieties Notes from Growers Cultural Notes

Brandywine

Clyde

BY F. WM. RANE

NEW HAMPSHIRE COLLEGE
OF
AGRICULTURE AND THE MECHANIC ARTS
DURHAM

NEW HAMPSHIRE COLLEGE

OF

AGRICULTURE AND THE MECHANIC ARTS

AGRICULTURAL EXPERIMENT STATION

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The Bulletins of this Station are sent free to any resident of New Hampshire upon application.

STRAWBERRY GROWING IN NEW HAMPSHIRE

BY F. WM. RANE

Of what value is the strawberry crop to the state of New Hampshire? It has been our purpose to obtain data along this line during the past season. After much inquiry, travel, and study in the interest of the strawberry, we have concluded to present the following bulletin, believing it will be somewhat helpful in bringing this very deserving fruit into still higher favor.

Although strawberries can be found upon our markets much earlier than we can raise them, and at very moderate prices, it does not seem to hurt the markets for our own fruit. People purchase sparingly of these early fruits, waiting for those that are home-grown for the festivals and canning period. There is a certain loyalty to home-grown fruits. Eaten in season they are better relished and more wholesome.

There can be no question but that the strawberry is a paying crop in the northern part of the state, when properly handled. They are late, thus coming when others are not available.

Experiments with this fruit were begun at this station one year ago the past spring, when fifty-four varieties were selected and planted in our trial grounds. The plants were given only ordinary care. During the fruiting period we were visited by many strawberry growers, who pronounced the test of great value.

FIG. 2.—Sorting Brandywine berries, just as they come from the patch.

I

NOTES ON THE FIRST YEAR'S TESTS AT THE EXPERIMENT STATION

During the past season we fruited fifty-four varieties. The list selected was thought to contain the cream of the varieties grown. The soil is a sandy loam, fairly fertile, and at a medium elevation. The ground was not prepared until the previous spring, at which time a turf was turned under, and a good dressing of complete commercial fertilizer applied and harrowed in. At least one dozen plants of each variety were set in rows three and one-half feet apart and eighteen inches in the row. They were trained to the medium matted row system. They made only a fair growth during 1896, a number being unable to set sufficient plants to promise an average yield this season. The mulch used was pine needles. Data has been taken of all varieties, but with a few exceptions will be reserved until the results from the same varieties are taken another season. A new bed was set last spring, containing a row of each of the fifty-four varieties, and as the season as well as the ground has been more favorable, we expect to be able to report more in detail another year.

The first general picking of varieties was made on July 2d, at which time the photographs shown in Figures 3 and 4 were taken. Each box shows the comparative quantity of fruit from one picking, as well as general character and size. Figures 5 and 6 contain the remaining varieties, taken July 7th.

Leaf Blight was very common and troublesome. While all varieties are subject to it, some succumb much more readily than others, although handled and treated similarly. It was thought that the percentage of blight as affecting each variety upon our trial grounds would be of interest; consequently data were taken as given in Table 1.

Table 1 also has been worked up by Mr. A. Z. Norcross, a student in the agricultural course, to show other general characteristics of each of the varieties as they have appeared in our test, as (1) character of foliage and size of leaf, (2) ability to propagate itself by means of runners, (3) ability to form a matted row, and (4) general remarks.

FIG. 3.—Varieties. Photographed July 2, 1897.

Bubach.	Warfield.	Bisel.
Crescent.	Cyclone.	Saunders.
Greenville.	Barton's Eclipse.	Splendid.
Lovett.	Beverly.	Berlin.

FIG. 4.—Varieties. Photographed July 2, 1897.

Enormous.	Beede No. 1.	Clyde.
Fountain.	Tuffs.	Enhance.
Gardner.	World's Champion.	Haverland.
Homestead.	Wm. Belt.	Ivanhoe.

TABLE 1

Comparison of the Plants of Varieties

No.	Variety.	Size of Leaf.	Number of Runners.	Matted or Not Matted Row.	Amount of Blight.	Remarks.
1	*Bubach	Medium	Few	Not	Slight	Old plants good.
2	*Crescent	Small	Fair	Narrow	Little	Foliage light. Plant not vigorous.
3	*Greenville	Medium	Not many	Loosely	Little	Foliage light.
4	Lovett	Medium	Few	Not	Slight	Foliage light to medium.
5	Parker Earl	Medium	Few	Not	Much	Old plants good and large.
6	*Warfield	Medium	Fair	Matted	Little	Plants small.
7	Brandywine	Large	Many	Wide matted	Much	Foliage heavy. Plant vigorous.
8	Brunette	Large	Few	Medium	Little	Plants large, but few resemble No. 34.
9	Cyclone	Medium	Many	Matted	Slight	Plants vigorous and many.
10	Leviathan	Large	Few	Matted	Slight	Plants vigorous, foliage spreading near ground. Suited for hill culture.
11	Marshall	Large	Fair	Matted	Much	Large plants, 7 in. Good for hill culture.
12	*Barton's Eclipse	Medium	Many	Thickly	Slight	Plant vigorous, foliage heavy.
13	Beverly	Large	Many	Thickly	Slight	Plant vigorous, foliage very heavy.
14	*Bisel	Small	Many	Matted	Much	Plants small, foliage spreading.
15	Saunders	Small	Many	Thickly	Much	Plants small.
16	Splendid	Medium	Many	Matted	Little	Foliage stands 7 inches.
17	*Berlin	Large	Few	Loosely	Much	Foliage medium.
18	Champion of England	Large	Fair	Loosely	Little	Foliage heavy, resembles No. 11.
19	Eleanor	Small	Fair	Narrow	Slight	Plants small.
20	*Enormous	Medium	Fair	Loosely	Slight	Plants vigorous.
21	Fountain	Medium	Fair	Matted	Little	Foliage 7 inches high.
22	Gardner	Large	Fair	Matted	Little	Plants fair size.
23	Homestead	Small	Few	Not	Little	Plants few and small.
24	Mineola	Medium	Many	Thickly	Little	Foliage stands high.
25	Beedle No. 1	Large	Few	Loosely	Little	Plants large and vigorous.
26	Tubbs	Small	Few	Loosely	Much	Plants small, foliage light.
27	World's Champion	Medium	Many	Matted	Little	Foliage heavy.
28	Wm. Belt	Medium	Many	Matted	Very much	Plants large, spreading.
29	Clyde	Medium	Many	Thickly	Little	Foliage erect, 7 in. high.

TABLE 1—*Continued.*

No.	Variety.	Size of Leaf.	Number of Runners.	Matted or Not Matted Row.	Amount of Blight.	Remarks.
30	Enhance	Medium	Many	Matted	Little	Plants large, foliage heavy.
31	Haverland	Medium	Few	Loosely	Slight	Plants medium size.
32	Muskingham	Small	Few	Not	Little	Plants small and few.
33	*Ivanhoe	Medium	Many	Loosely	Little	Foliage not heavy.
34	Leader	Medium	Fair	Thickly	Sligh	Plants vigorous. Short and broad leaf.
35	*Princess	Medium	Fair	Loosely	Little	Foliage not heavy, like No. 34.
36	*Princeton Chief	Medium	Many	Matted	Much	Foliage heavy.
37	Wolverton	Small	Fair	Matted	Very much	Plants small, foliage heavy.
38	*Timbrell	Medium	Many	Thickly	Little	Foliage heavy, 7 in. high.
39	Rio	Medium	Many	Thickly	Little	Plants good, foliage heavy.
40	Columbian	Medium	Many	Thickly	Much	Foliage heavy, standing high.
41	*Holland	Medium	Many	Thickly	Much	Foliage heavy, standing 7 in.
42	Lady Thompson	Medium	Fair	Loosely	Little	Plants large.
43	Paris King	Medium	Many	Thickly	Little	Foliage heavy, standing 7 in.
44	Wilson	Small	Many	Thickly	Little	Foliage heavy.
45	Annie Laurie	Medium	Few	Not	Little	Plants large, resemble No. 34.
46	Bouncer	Medium	Fair	Thickly	Much	Foliage heavy, standing 7 in.
47	Glen Mary	Medium	Many	Thickly	Little	Plants large, stands over 7 in.
48	Brooks Seedling	Small	Many	Thickly	Little	Plants small, foliage light.
49	Gandy	Medium	Many	Matted	Little	Foliage heavy.
50	*Jersey Queen	Medium	Fair	Not	Little	Foliage not heavy. Old plants large.
51	Cumberland	Small	Many	Thickly	Little	Foliage heavy, Leaf like No. 34.
52	*Jewel	Medium	Many	Matted	Slight	Plant vigorous.
53	Jessie					
54	Fremont					

*Pistillate varieties (imperfect).

FIG. 5.—Varieties. Photographed July 7, 1897.

Parker Earle.	Leviathan.	Leader.
Brandywine.	Marshall.	Princess.
Brunette.	Champion of England.	Princeton Chief.
Cyclone.	Mineola.	Woolverton.

FIG. 6.—Varieties. Photographed July 7, 1897.

Timbrell.	Lady Thompson.	Brooks Seedling.	Jewel.
Rio.	Paris King.	Gaudy.	Jessie.
Columbian.	Bouncer.	Jersey Queen.	Fremont.
Holland.	Glen Mary.	Cumberland.	Eleanor.

DESCRIPTIVE NOTES ON POPULAR VARIETIES

Beverly (perfect flower).—Medium to large fruit, of good form and color. Plant vigorous, heavy foliage, and sets many runners. The berries are large at the beginning of the season, but do not seem to hold out well. This variety is very well known by all growers in the state.

Brandywine.—This is a perfect flowering variety, which seems to be gaining favor wherever it has been thoroughly tried. On our grounds during the past season it proved to be one of the best medium to late sorts. The general opinion of growers is that although it does not excel in productiveness, its other good qualities make it valuable. While it does not yield as heavily as some of the medium early varieties, it equals the late sorts, and surpasses most varieties in size, color, and general appearance. The plants are very vigorous, large, set plenty of runners, and fruit freely. The berries are very large, and of regular, broad, conical form; bright glossy red in color, which extends to the center; flesh firm and excellent in quality. The fact that it is a perfect flowering variety together with the other good qualities named gives it a prestige which renders it worthy of a general trial.

Brunette (perfect).—Large, healthy leaves, but sets few plants. Berry, medium to large, uniform and regular; color, dark red; form, conical to roundish; season, second early. Not very productive this season.

Buback (pistillate).—This variety is considered very valuable and is commonly grown. The objection to it is that it sets few plants. Where given the best of attention it responds liberally. It is well adapted to hill culture. The berry is large, broad conical and sometimes flattened in form; color scarlet, fair quality, season medium.

Clyde (perfect).—A promising new variety. It showed up well in the test this season; plants vigorous; berries medium to large, fairly firm, good quality; form, conical regular, uniform; color, light scarlet with a whitish center. Leaf medium; sets many runners, makes a well formed matted row, and is little troubled with blight. Foliage stands erect; berries are about the right size, maintaining it throughout the season.

The only drawback to the variety is on account of color and perhaps firmness. It deserves a trial.

Crescent (pistillate).—An old standard variety still planted extensively. Berry small, bright scarlet, moderately firm, fair quality; form, conical. Ripened first on June 22d and extended over a long season. Productive.

Greenville (pistillate).—A popular variety in this state. Berry large, dark red, medium firm, fair quality; form, broad conical. Medium leaf, loosely matted row, little blight, season second early.

Haverland (pistillate).—An old variety still commonly grown, but discarded by many on account of softness. Good for a market near at hand. Plants were medium size and formed a loosely matted row; leaf medium, dark green, with long stems; berry, large, long conical. It was productive and healthy during the past season.

Lovett (perfect flower).—A variety grown by most growers and valuable as a fertilizer of such varieties as Crescent and Haverland. Berry large, firm, good quality; form, long conical; color, bright red. Plants strong, healthy, and productive. Runners comparatively few during the past season, leaf medium, very little blight.

Marshall (perfect).—From a two years test this variety has shown itself to be hardy, vigorous, and fairly productive. Berry, large to very large, medium firmness, high quality; form, rather irregular; color, deep red. A very desirable amateur variety. It lacks in texture and productiveness, causing many to discard it. For a fancy trade it is well worthy of consideration.

Parker Earle (perfect).—The berry was small and not up to its reputation this season; probably our ground was not rich enough. It is generally conceded to be a very valuable late variety when given high culture and plenty of moisture.

Warfield (pistillate).—A popular variety in the state. Has a comparatively long fruiting season, makes numerous runners which need thinning, and requires plenty of moisture to get best results. Berry medium to large, firm, good quality; form, conical; color, crimson. Generally liked.

II

NOTES FROM LOCAL GROWERS.

During the strawberry season we made it a point to visit and procure data from many of our local growers. Accordingly, Mr. George F. Beede's place at Fremont was visited by myself; and afterwards, Mr. Hunt, my assistant, visited and obtained the data herein given from the following named growers: Messrs. J. C. Piper, Stratham; G. S. Tuttle, Barrington; James Hayes & Son, Dover; George D. McDuffen, Dover; Mr. C. B. Flanders, Concord; W. H. Allen and G. A. Tripp, Dover. This is only a partial report of a few of the leading growers. It is hoped that all other strawberry specialists will favor us with their addresses.

The growing of strawberries is a question which we have found the growers carefully studying each for his own good. Although there are some minor differences as to the varieties, due perhaps to the surrounding conditions, yet as to the fundamental principles of the care and management, all are in unison. In interviews with many leading growers in different parts of the state, they have given their methods of cultivation, which have aided us very materially in reaching general conclusions on strawberry culture throughout the state.

Strawberries have been most successfully grown on a rich clay loam which has had a liberal application of barnyard manure or commercial fertilizer; yet in some instances it appears that too much has been added and the plants have sacrificed fruit for foliage. However, it is our opinion that on most of the strawberry land the application of manure will greatly aid in the productivity of the plants. Strawberries are known to require considerable moisture, and unless it is found naturally in the soil it must be applied, in order that the plants may be in a vigorous state of growth until after fruiting time. If the plant is small and weak it cannot be expected to give the amount of fruit that a vigorous one would. At the time of setting and ripening of fruit a large amount of water is taken up by the plants, and this, of course, has to be supplied by the roots from the soil.

Irrigation is very enthusiastically advocated by J. C. Piper of Stratham, who says it has paid immensely; the crop was much larger and the berries were first class. Varieties like the Crescent maintained their full size until the very last picking, and all the fruit which set ripened into well-developed berries. This may be a surprise to many growers, for it is known that nearly all varieties become smaller towards the close of the season.

The distances for planting depend upon the soil, growth of the plant, and method of cultivation. Mr. Piper for a while set his plants in rows three, three and one-half, and four feet apart, but last season beds were planted in which the plants were fifteen inches apart, omitting each third row; also others where every fourth and every fifth row was omitted. No runners were allowed to grow. G. S. Tuttle of Barrington finds it best to set his plants three and one-half by seven feet and placing two or three plants in each hill. The fields are then cultivated both ways by horse power, and after a time the plants are allowed to run, forming rows in which the hills are seven feet apart. Every one of the growers visited is decidedly in favor of clean cultivation. W. H. Allen of Dover says thorough, clean culture upon soil liberally fertilized with a light mulch for winter has given him good fruit every year; and this seems to express the sentiment of other growers throughout the state.

Mulching through the winter meets with much favor, and in connection with clean culture and irrigation has made a decided change in the problem of strawberry raising. It has paid as well as irrigation. A plot left unmulched last winter has not yielded one-half the fruit of mulched areas. Although the plants lived, the line of mulch was distinguishable at a distance all through the season,—foliage was weak, pale, and scant; leaf and berry stalks short and weak; consequently but little fruit.

As to the varieties, there is a difference of opinion and always will be as long as berries are grown; but the practical growers quoted agree upon the merits of the following varieties:

(1.) Bubach, Crescent, Lovett, and Warfield.

(2.) Greenville, Haverland, and Beverly.

(3.) May King, Sharpless, Marshall, and Michel's Early. Brandywine and Clyde seem to be gaining general recognition.

Mr. Beede is probably the veteran grower of the state, and is recognized as an expert. He has produced some very good seedlings. One hundred and fifty varieties is not an uncommon number for him to grow. His market berries, however, are always limited to a few varieties of his choice. We consider ourselves fortunate in being able to present the following data, which enables us to give a history of varieties during the past five years.

1893 Report.—"Out of a great number of varieties tested this year twelve proved to be very good, among which are the Beder Wood, Beverly, Bubach, Crescent, Haverland, and Warfield. Eureka was quite productive, but the berries were very small and light colored. In the order named Beder Wood, Warfield, Crescent, and Haverland were the earliest, Beverly and Parker Earle the latest. The most profitable, Beverly, Warfield, and Crescent. The most productive, Haverland and the last three named above. The largest in size, Bubach, Beverly, and Barton's Eclipse. Out of a long list of novelties and newer varieties which have proven very promising we have the Brandywine, Cyclone, Greenville, and Marshall."

1894 Report.—"I need a good-sized, bright, showy berry, firm enough to stand up and look well a day or two after picking. The following proved best for me this season: Barton's Eclipse, Beverly, Bubach, Cyclone, Lovett's, Parker Earle, and Warfield. I still plant Crescent and Wilson to a limited extent for their productiveness, but they are too small to go in a selected list. I have rejected Beder Wood for softness and small size in last pickings. Haverland, I regret to say, must go on account of softness. For near market it is one of the best, and must be included in a list of the best five for all purposes. All things considered, Beverly, Bubach, Haverland, Lovett's, and Warfield are the best five varieties. For the most profitable, Beverly and Bubach are still in the lead as they are also the largest in size. Enhance, Eureka, Great Pacific, and Shuster's Gem were productive, but too soft or light colored. Swindle was very productive, late, firm, and good color, but the foliage failed before all the berries ripened. Saunders, fine and productive, better adapted to home use than for market. Seventy-nine others were grown, but do not find them valuable enough to retain. Among them are Gandy, Jessie, Jewell, Jucunda, Improved, May King, Michel's Early, and Sharpless. Of the new varieties, those that are strong, vigorous growers, with healthy foliage, are: Bisel, Carrie, Hunt's No. 3, Ivanhoe, Mary, Rio, Robinson, Splendid, and Tennessee Prolific."

1895 Report.—"My strawberry crop the past season was more than an average one. By a high location I nearly escaped the frosts in May, which came after blossoming. Some of the most tender varieties were slightly damaged. My beds were all heavily mulched with meadow hay. The ex-

perimental beds of new varieties were very satisfactory in one respect, the plants were in the best of condition, giving much value to a one year test.

"The test of another year shows no reason to change the select list, excepting two additions. Barton's Eclipse, Beverly, Bubach, Cyclone, Lovett's, Parker Earle, and Warfield, with Brandywine and Greenville, proved best this season. Beverly and Brandywine gave plenty of fine berries late in the season, and they were sold in the market as late as July 15, and had plenty for home use a week later. Rio and Afton were the most promising new early varieties, though Afton is too small for market.

"After a second year's trial, Brandywine, Cyclone, Glen Mary, and Greenville, apparently, are good enough to go into the select list. Glen Mary and Greenville are a little off in quality, though no poorer than Bubach or Haverland. They give such an abundance of large, showy berries, that they must prove favorite varieties. Timbrel was large, very productive, and of best quality, but not liked at home or in the market for its light and spotted color, Berries in the shade were all pure white when ripe; I have no use for it. All other varieties tested the second year were not desirable."

1896 Report.—"The test of another year shows no reasons to change the list of standard varieties. I shall discard Cyclone, Parker Earle, and Warfield from extensive planting: Cyclone for uncertain bearing, the others for small size. I shall add Clyde, reserving the point of color for future testing; that is, I shall not set it very extensively if its color proves a serious fault. It is described in most catalogues as dark red or dark scarlet, but it does not show up that way here, and the rows are narrow,—eighteen inches wide.

"New beds were much injured by an open winter. Old beds, especially of Beverly and Brandywine, were productive. My market for fruit is becoming educated and I cannot, profitably, set many varieties of small size and poor quality. For these reasons, Crescent, Parker Earle, Warfield, and Wilson of standard varieties are discarded. Haverland is too soft for one to handle. Varieties of large size like Bubach, Glen Mary, and Mary lack quality for my customers. I want varieties good enough so there will be a call for them the second time. Clyde is so large, perfect in form, firm and good quality, that it will please all that get acquainted with it, but it will not be a berry that will sell on sight like Belmont, Brandywine, and Marshall. This is my opinion of Clyde for a fancy market. I know of no staminate variety more productive, so I would advise all that want a good fertilizer for pistillate varieties to give it a trial.

"I tested, in 1896, for the first time about seventy-five varieties. Judging from one season's trial, Clyde will easily be worthy of a place in the list of select varieties. Annie Laurie, Aroma, and Brunette are desirable for home garden. Gandy Belle (same as No Name and Isabella), Enormous, Paris King, Fountain, and Staples have many points of value for market purposes, but a few standard sorts are better. Ruby (No. 6), received for trial from E. A. Riehl, Alton, Ill., is worthy of thorough trial. Perfect plant, very large. handsome fruit, fine color, quality, firm. Apparently not productive enough for common market. See's No. 1, from H. S. and A. J. See, Geneva, Pa., is very early, and all right every way excepting size. It is too small to

be valuable. Seedling A, from Rev. E. B. Stevenson, Freeman, Ont., is of more than average value."

1897 Report.—"Old beds, bearing the second year, were very productive. New beds were good, especially Brandywine and Clyde. Heretofore I have been inclined to think rust on the plant was wholly a weakness of the plant. It is a well-known fact that some varieties, like Lovett and Clyde, never rust, are, so to speak, rust-proof. This season gave me a new lesson. *All varieties were free from rust;* even Wm. Belt was clear and healthy in leaf, and the quantity of very large, fine fruit was equal to the most productive pistillate varieties like Haverland, Warfield, and Bubach. The same with the staminate varieties, Clyde, Lovett, and Beverly. Carrie (pistillate) seedling of Haverland was fine in every respect. For fine color, shape, and quality, I know of no variety equal to Brandywine for my location, either for family use or fancy market. The pickings are uniform, season late and long. The bushels at the end of season tell the story.

"Beverly, Brandywine, Bubach, Greenville, Lovett's, and Warfield are the leading varieties with me. Haverland, Barton's Eclipse, and many other productive varieties prove too soft for my market. I picked Brandywine on July 9th, a very hot day, sent to market the 10th, the last of which were sold the 14th and were in fine order.

"I tested for the first time this season Bismarck, Bouncer, Gulick's No. 7 and No. 8, Duncan, Howells, Hurlburt, Hayes' Eclipse, Anna Kennedy, Ideal Oriole, Ocean City, Maxwell, Michigan, Sparta, and Tennyson. Gulick's No. 7, excellent in all points; Sparta, not productive; Bismarck, coarse and poor quality; Bouncer, similar to Miner's Prolific and Beverly, but not so productive. We shall soon lose sight of the others.

"I have to fruit for the first time next season Hall's favorite, Margaret, McKinley, Mele, Ridgeway, and Seaford.

"We have varieties of mid-season and late that are close to perfection. The great lack is a very early variety. I had great expectations of Rio. It blooms freely, is early, large, good color, firm, and best quality, but the blossoms blight badly and give only two or three pickings."

Figures 1, 2, 3, and 4 were all taken when visiting Mr. Beede's place on July 2d, 1897. Figure 2 is a cool, dark, well-ventilated packing-shed. The berries are the Brandywine, which Mr. Beede prizes very highly. They are shown just as they come from the field without grading, all being above the average size, highly flavored, firm, and of good color. He grades them simply by turning from one box into another, picking out the small and inferior berries.

Should the reader desire further information on strawberry growing from Mr. Beede himself, he is referred to a paper presented before the Plowman's meeting in Boston, Feb. 29, 1896, published in the *Massachusetts Plowman*, March 7, 1896.

III

CULTURAL NOTES

This being the first bulletin from the station on the strawberry, the writer finds it necessary to discuss the cultural directions in order to meet a number of inquiries already at hand, as well as to place before others such information as is likely to be desired.

The same general principles hold true in strawberry culture, whether grown for home use or the market.

Soil and Fertilizer.—Strawberries do well on almost any well-drained soil, reasonably fertile and at a fair elevation. A friable clay loam gives the best results if properly managed. Fall plowing, together with a liberal application of fertilizer and thorough cultivation, ensures a greater degree of success. There is little danger of making the soil too rich, the only precaution being an understanding of the action of the commercial fertilizers, as there are possibilities of injury when used in large quantities close to the plant. A thoroughly well-rotted manure is an ideal fertilizer, but where the soil contains plenty of humus, as in the average garden, wood ashes and ground bone give good results. Where wood ashes are not to be depended upon, sulphate or muriate of potash will do as a substitute, using a proportionately less amount (ordinarily one-tenth as much). The soil having thus been plowed and mulched, it is left in this condition until spring. The next step is to fit the land to receive the plants, which is done with the cultivator, harrow, and roller.

This plan is the one to be practiced at the station. Strawberries, however, are often planted at other seasons of the year, August being considered by some the best month. What has been said of the proper conditions of soil for the spring planting applies equally well here. The soil should be in condition to receive the plants early to ensure success. A good plan is to use the land from which some hoed crop has been taken. The soil is then in a fine degree of tilth. The white grub (*Lachnosterna fusca*) and a few other insects are so frequently troublesome where strawberries follow sod that few people ever

practice it. The crop is usually preceded by some cultivated crop such as corn, thus eliminating the trouble from both insects and weeds. A crop of clover or other green manure known to be free from these troubles will, when plowed under, prove of great value to the crop. Coarse manure also may be turned under with good results, provided it is applied early enough to be well decomposed and mixed with the soil by planting time. The objection to manure on account of its contamination with weed seeds is easily overcome by better cultivation and preparation before planting.

Commercial fertilizers are commonly used for strawberries. Where the crop is grown in the rich garden soil, the results are quite marked; but where grown on a field scale, they are not as valuable as good barn-yard manures. No rule can be given for the proper application of fertilizer per acre for successful strawberry growing. Every soil is necessarily different from every other as regards physical, mechanical, and chemical properties. From study of the soil in question it is thought that with the aid of the following table one can judge from previous experience as to what should be considered a liberal application.

The New York station recommends the following table of fertilizers for the strawberry.*

For nitrogen....	(1). 150 to 300 lbs. nitrate of soda, applied during the growing season; or (2). 125 to 250 lbs. sulphate of ammonia; or (3). 250 to 500 lbs. dried blood.
Phosphoric acid.	(1). 550 to 1100 lbs. bone meal; or (2). 375 to 750 lbs. dissolved bone, etc.; or (3). 450 to 900 lbs. dissolved rock.
Potash.....	(1). 140 to 280 lbs. muriate; or (2). 140 to 280 lbs. sulphate; or (3). 550 to 1100 lbs. kainit; or (4). 1400 to 2800 lbs. wood ashes.

Setting Plants.—The best time for setting the plants, as stated, is in the early spring. By so doing the plants become thoroughly established, and if given proper cultivation and training usually ensure a maximum crop the following season.

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FIG. 7. NEWLY SET PLANTS (GEO. F. BEEDE).

On the other hand, plants started in pots in the spring are often set out in late summer or early fall. Although this latter system is quite a popular one, only from one-third to one-half the crop is obtained the first season. Its advocates, however, show that by so doing, a previous hoed crop may be obtained. Pot-grown plants cost more than the ordinary field-grown.

No plant needs more care in transplanting. The crown should be on a level with the soil, no lower, no higher; the roots should not be allowed to get dry. Dip them in water when they begin to get dry. Trim the roots back at least one-third and spread them fan shape when setting, filling in gradually; firm well.

Distance apart to set plants depends upon how they are to be trained.—There are two methods of setting out strawberry plants commonly practiced, each of which depends upon the proposed system of training. These are (*a*) Hill culture, which, as the term implies, consists in growing each plant by itself in a hill, not allowing the runners to grow or flowers to

set the first season. This causes each plant to become stalwart and large, and where properly grown are very productive the following year. The plants are usually set in rows three feet apart and one foot apart in the row. This method is little used by commercial growers on account of its requiring too much time to keep off the runners. Where one has a small garden and desires to make a fine display, hill culture will prove of value.

(*b*) Matted rows. This is the method commonly used by commercial growers. The plants are set in rows varying from three to four feet apart, and from fifteen to eighteen inches apart in the row. When the runners start they are either placed or allowed to run at will. When well set they form a continuous matted row. The grower can suit himself as to just how wide the row should be and train accordingly. After having blocked out the row, cut off the runners to keep them within bounds. When the row is about twelve inches wide it is termed the Narrow Matted Row, and when about double that width, the Wide Matted Row. To get the finest berries the runners should be thinned out at some time during the season. It is a good practice to do this after the rows are formed for fear that drouth, insects, etc., may assist. Where plants are fall set, comparatively few runners form. The plants should not set any fruit the season they are transplanted, which is prevented by picking the flower clusters.

Bearing Period.—Just how long a bed should be kept in bearing seems to be a disputed question. Commercial growers are generally agreed that from the dollar and cent standpoint, more is made from the fruit of the first season than any other. It is larger, plants are less troubled with insect enemies and diseases, and it costs less to plant a new than clean out an old bed. While this is generally advocated, it is not universally followed, as many growers hesitate before turning under a patch that looks well and promises fair returns for a second crop. That the fruit of the second season is earlier has been proved, also that the varieties fruit more readily; but because of their inferiority in size are less profitable.

The variety has a marked influence upon this question; in fact if some were not grown for two years, they would be dis-

carded without a fair trial. But with the majority, where the berry is only of medium size the first season, as is the case with many of our market varieties, it naturally follows that they will be inferior the second year. Another reason for fruiting the second and third seasons is to ensure a crop, as some years plants do not set new runners abundantly.

Where the bed is retained it is necessary to clean out the rows as soon as the last fruit is gathered, properly cultivating the intervening soil. Some practice burning over the plantation before cultivation. To do this mow off the tops of the plants and burn. Rust, insects and old mulch are thereby destroyed. This is done as early as possible to give the plants an opportunity to form new leaves and fit themselves for winter. While this method is often successful more experience is required to manage the plants than with the renewal system.

Mulching.—It is necessary to protect strawberry plants with some material during the winter to prevent trouble from freezing and thawing. The plants are perfectly hardy and capable of withstanding freezing, but some soils are liable to heave; and the mulch remedies this. It serves not only to prevent heaving but in fruiting time to keep the berries clean, and to conserve moisture. It is usually applied as soon as the ground freezes sufficiently to bear up a wagon and team. The material varies in different places, that most easily obtained at a minimum price ordinarily being used. Coarse manure, marsh hay, pine needles, pine boughs, clean wheat straw, leaves where held in place with some other material, etc., are the most common. Just what to recommend is a question, depending upon the nature of the soil, etc. Always avoid a mulch containing weed seeds, as it often costs as much to clean out the weeds as it would to purchase the more expensive material. In the spring the mulch may be left between the rows or drawn off, giving an opportunity for cultivation. Ordinarily, however, experience would say not to remove it, as it serves to retain moisture.

Perfect and Imperfect Flowers.—It is a matter of importance that all strawberry growers know the difference between these two classes of flowers. The perfect or bi-sexual blossoms contain stamens or male organs and pistils or female organs.

FIG. 8.—Harvesting the crop; first season wide matted row (Geo. F. Beede).

The imperfect or pistillate blossoms contain pistils only. It is necessary to know before transplanting what varieties are pistillate in order to plant perfect flowering sorts near enough to ensure fertilization. One row in every two to four of the pistillate sorts is sufficient. The pistillate varieties usually yield more heavily than other varieties when well fertilized.

SUMMARY.

1. Southern grown berries do not come into competition with home-grown fruit.

2. The culture is the same for berries both for home use and the market.

3. The strawberry does well wherever given good cultivation, proper drainage and plenty of fertilizer in available form.

4. Well-rotted manure, bone meal, and wood ashes (or some of the potash salts), are considered the best fertilizers.

5. Fall plowing, mulching with manure and thorough preparation of soil before setting plants are the first steps in strawberry growing.

6. A crop of clover or other green manure known to be free from insects will when plowed under prove of great value to the crop.

7. Coarse manure may be plowed under with good results, provided it is applied early enough to be well decomposed by planting time.

8. Spring set plants give the best results; where fall set they should be grown especially for that purpose, small pots being most commonly used.

9. Where plants are grown by hill culture they are usually set in rows three or three and one-half feet apart, and one foot apart in the row; all runners and blossoms being kept off the first season.

10. In matted rows, the rows are from three and one-half to four feet apart and plants are set from fifteen to eighteen inches in the row, according to variety and width of row.

11. Fruiting one season only is usually advocated by best growers. It is less work and more profitable to set a new bed than renovate an old one.

12. It is necessary to protect the plants in winter by mulching with some material such as straw, marsh hay, pine needles, pine boughs, coarse manure, etc., to protect from heaving.

13. Failure to get a maximun crop frequently comes from improper fertilization. Have at least one row in every four, of a perfect flowering variety.

14. The practical growers quoted agree upon the merit of the following varieties:

(1). Bubach, Crescent, Lovett, Warfield.

(2). Greenville, Haverland and Beverly.

(3). May King, Sharpless, Marshall, Michel's Early.

Brandywine and Clyde seem to be gaining general recognition.

15. Irrigation has proven of great value wherever tried.

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